

Electrotechnics

Code: MK3ELTER06RX17-EN

ECTS Credit Points: 6

Evaluation: exam

Year, Semester: 1st year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

Introduction to DC circuits: voltage, current, basic components. Network analysis: Ohm's Law, Kirchhoff's Law, current and voltage divider, superposition, Thevenin and Norton's Law. Alternating current circuits: sinusoidal wave, calculation on the complex plane, power and effective values. DC and AC power. Transient signals in the AC circuits: series and parallel RLC circuits. 3 phases circuit.

Literature:

Compulsory:

- Electronic Circuits: Handbook for Design and Application, U. Tietze, Ch. Schenk, 2nd edition, 2008, ISBN-10: 3540004297

Schedule

1st week Registration week

2nd week:

Lecture: Electrostatics, DC networks: basic electrical concepts of electric charge, electric current (amperage), electric field, electric field work, electric voltage (potential), electric circuit

Practice: General description, laboratory regulations, Safety regulations and safety instruction

4th week:

Lecture: Passive resistance of bipolar networks, Star-delta, delta-star conversion, Electrical work, electric power, efficiency

Practice: 1st measurement: measuring the characteristics of DC voltage (U, I, RB, P) using Ohm's Law. Report writing.

6th week:

Lecture: Network analysis: Nodal analysis, Mesh analysis, superposition theory

Practice: 3rd measurement: measuring the values of DC circuit. Using voltage

3rd week:

Lecture: Power source (ideal real), Power Source (ideal for real), Consumer, Ohm's Law, Resistance - design, characteristic data, division, marking according to IEC standard.

Practice: Introduction to measurements and instrumentation (measuring error, power supply, digital multimeter, signal generator)

5th week:

Lecture: Network analysis: Kirchhoff's laws, Voltage divider, potentiometer, extending measuring range of a Volt meter current divider, extending measuring range of an Amp meter, Wheatstone bridge

Practice: 2nd measurement: measuring the values of DC circuit. Using Kirchhoff's laws. Report writing.

7th week:

Lecture: Network analysis: Northon and Thevenin theory

Practice: 4th measurement: Perform a complex DC measurement and calculation task. Report writing.

and current divider. Report writing.

8th week: 1st drawing week

9th week:

Lecture: AC circuit, complex number, AC circuit mean value (RMS).

Practice: 5th measurement introduction to AC measurements and instrumentation (AC type digital multimeter, signal generator, oscilloscope, LRC meter). Report writing.

11th week:

Lecture: AC circuit network analysis, AC Kirchoff's laws

Practice: 7th measurement: alternating current analysis of capacitive and inductive elements. Analysis of serial and parallel RLC circuits. Report writing.

13th week:

Lecture: Transient signals in the AC circuits

Practice: 9th measurement: Measuring of serial RLC circuit. Report writing.

15th week: 2nd drawing week

10th week:

Lecture: Behaviour of a resistance in AC circuit, inductance behavior in AC circuit, capacitance behavior in AC circuit.

Practice: 6th measurement: Alternating current, voltage characteristics measurement (U_{eff} , I_{eff} , f , P , waveform) using Ohm's law. Report writing.

12th week:

Lecture: Performance of AC circuits, power factor correction, Three-phase systems

Practice: 8th measurement: alternating current analysis of wien-bridge. Report writing.

14th week:

Lecture: Advanced alternating current circuits: RL, RC, RLC circuits, parallel RL, RC, RLC circuits.

Practice: 10th measurement: Measuring of parallel RLC circuit. Report writing.

Requirements

A, for a signature:

Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up a practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. Missed practice classes must be made up for at a later date, being discussed with the tutor. Active participation is evaluated by the teacher in every class. If student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate his/her participation as absence because of the lack of active participation in class. During the semester there is one test. Students have to sit for this test.

Preparing measurement reports until deadline.

B, for a grade:

At the end of the course an exam must be taken. The minimum requirement for end-term test is 41%.
Score Grade 0-40 fail (1) 41-55 pass (2) 56-70 satisfactory (3) 71-85 good (4) 86-100 excellent (5)